

..... **DIVISION OFFICE**
1999 INSPECTION GUIDE (METRIC VERSION)
Inspection-In-Depth: Major Structures - Concrete Plant and Placement

PROJECT DATA:

Project Number:
County:
Inspection Made By:
In Company With:
Date of Inspection:
Percent Complete:
Percent Time:

SCOPE OF INSPECTION:

The overall purpose of this inspection is to evaluate project enforcement of established inspection procedures as it relates to Structural Concrete. The items of interest are concrete plant operations, form work, reinforcing steel and concrete placement. As part of the inspection review a determination should be conducted on the existing procedures and/or specifications as to whether they are practical and easily understood and implemented by personnel and the contractor and whether field personnel have sufficient training, ability and interest to thoroughly understand and enforce existing procedures and specifications. The Area Engineer is provided the flexibility of using the guideline in its entirety or portions depending on job conditions and time limitations. This guide may be supplemented as deemed necessary by the Area Engineer for items distinct to the individual project. It is suggested that prior to the inspection, a review of all applicable provisions be made in order that a broad knowledge of the provisions can be achieved and utilized during the inspection.

REFERENCES:

- Standard Specifications and Supplemental Specifications,
- Special Provisions,
- Construction Directives,
- Construction Manual

I. Concrete Plant Operation

1.
 - a. Are mix designs available for each class of concrete?
 - b. Are they approved?
 - c. Dates approved?
2.
 - a. Is the concrete plant approval available?
 - b. Is the certification still valid?
 - c. Expiration date?
 - d. Is the plant inspection checklist used by available?
 - e. Plant Type? (Central Mix, Transit Mix, Automatic, Manual, Manufacturer)
 - f. Manufacturer's Rating?
 - g. Has the mixer been checked for condition and wear (Section 601.5.3)?
3.
 - a. Have the scales been inspected and sealed?
 - b. Expiration date?

- c. Are the Ten - 20 kg weights available?
 - d. Have the scales been zero balanced and sensitivity checks been conducted?
- 4.
- a. Is the Quality Control Plan available?
 - b. Is it Approved?
 - c. Date approved?
 - d. Approved by whom?
- 5.
- a. Are the aggregates properly stored?
 - b. Are intermixing, segregation, and/or contamination problems present?
 - c. Where are the aggregate samples being taken (Section 601.5.2.7)?
 - d. Are moisture tests being performed?
 - e. Are the tests being documented?
- 6.
- a. What is the water source used?
 - b. Is the source approved?
 - c. Comment on the water quality. Is it clean and free of oil, salt, acid, alkali, sugar, vegetation, etc.?
 - d. Is the water added to the mix adjusted for moisture in aggregate?
 - e. Is water added at the project site, or at the plant?
 - f. Comment on the accuracy of the water measuring equipment (within 1%)?
 - g. Is additional water being added at the project site?
 - h. What is allowable Water/Cement (W/C) ratio from mix design?
 - i. What is the W/C ratio that is being used (Section 601.7)?
- 7.
- a. Is the cement bin and weight hopper properly sealed?
 - b. Is the cement bin clean and dry?
 - c. Is the Fly ash in a separate bin?
 - d. Is a Material Certification for the Fly ash available?
 - e. Are adequate records being kept of cement being delivered to the batch plant to properly track quantity received vs. quantity used for test coverage?
- 8.
- a. Note the Field Laboratory location.
 - b. Is the lab properly equipped?
 - c. Is the lab in a reasonable proximity of plant?

9.
 - a. Are laboratory tests documented and available for water, cement, air entraining agent, retarder, curing compound, aggregate gradations, etc.?
 - b. Where are the control charts being maintained?

Are they complete and up to date?

Are there any undesirable trends noted?

Comments:
10.
 - a. Is the Plant Inspector's Diary up to date?
 - b. What entries are being made in the plant diary? (Materials received, tests, checks, etc.)
 - c. Does the State or Contractor's Quality Control Personnel maintain a Plant Diary?
 - d. Comment on the documentation of instructions to the contractor:
11.
 - a. Comment on the knowledge of plant personnel:
 - b. Comment on Personnel Certification:
12. General/Additional Comments on the Concrete Plant Operation:

II. Concrete Placement:

1. Form Work (Section 601.8)

- a. Type of form materials used?
- b. Is the mortar tight, and clean?
- c. What form treatment is being utilized (Section 601.8.5)?
- d. Are "Telltale", used for settlement monitoring, in-place?
- e. Is the form work adequately supported and true to line and grade?
- f. Has the overhang support been sufficiently checked (SD-7)?
- g. Is form removal (Section 601.8.7) based on early cylinder breaks or specification guidance?
- h. Slip forming (Section 601.8.8)?
- i. Any field welding noted?

2. Reinforcing Steel

- a. Are rebars being properly stored at the job site?
- b. Are the rebars clean?
- c. In the case of epoxy coated rebars, is the coating sound?

- d. Note bar sizes, spacing, clearances and general layout of steel mat.

	Plan	As Built
Rebar Size		
Bar Spacing		
Clearances		

Are they in accordance with the plans?

- e. Is the reinforcing steel adequately supported?
- f. Are bar splices in compliance with the 30 bar diameters minimum overlap?
- g. Comment on welding (Only if shown on the plans)?
- h. Field bending of reinforcing bars noted (Section 602.5)?

3. Concrete Operation

- a. Form work and reinforcing steel checked and approved to concrete placement?
- b. Was a preplacement conference held?

Note items discussed (type of equipment, pour sequence, schedule, etc.)

- c. Was a dry run prior to concrete placement conducted?
- d. What is the minimum required placement rate for the operation observed?

_____ cubic meters/hr

- e. Note the time placement commenced and was completed.
- f. What placement rate was actually achieved?

_____ cubic meters/hr

- g. How was the concrete delivered (Chute, bucket, trough)?
- h. Was proper technique executed?
- i. Was concrete dropped through the air less than 1.5 meters?
- j. Is concrete rehandling being avoided as much as possible?
- k. Is concrete placed against previously placed concrete at all times?
- l. Are concrete trucks clean of build-up and agitator blades not worn?
- m. Note the condition of the contractor's equipment.
- n. Were vibrators sufficient in quantity to do the work that was needed?
- o. Were vibrators being used for a sufficient duration but not to the point of segregation?

- p. Were vibrators being used to move concrete?
- q. Note the type of placement/finishing machine used?
- r. Was screed support adequate to maintain line and grade?
- s. Was water applied to the surface to aid finishing?
- t. Was a straight edge being used?
- u. Was a rolling straight edge used?
- Any surface deficiencies found?
- Corrective action taken?
- v. Were texture grooves 3 mm to 5 mm deep? (Section 601.11.4)
- w. Comment on curing (Section 601.12) as to type, adequacy, timeliness, cold weather conditions, and maintenance of curing?
- x. Note general weather conditions during concrete placement operation.
- y. Comment on the establishment of adverse weather condition plans (Section 601.9) and their applicability.

4. Field Testing

- a. Observe State or Contractor's personnel conducting sample and field testing procedures. Comment on the following:
 - sample source,
 - performance of tests in accordance with accepted test procedures,
 - equipment adequacy,
- b. Any material rejected?
- c. Record a sampling of test results for specification compliance:

AIR (%)	SLUMP (mm)	TEMPERATURE (Celcius)		DEPTH CHECK		IN COMPLIANCE (Yes/No)
		Air	Mix	Full Depth of Steel	To Top Mat	

5. General/additional comments on concrete placement:

III. Project Records

1. Review inspectors daily reports (IDR'S), Supervisor's daily reports, HL-440's, and progress estimates. Comment on the documentation as to quantities used, work performed, test results recorded, problems encountered, and proper cross referencing.

2.

- a. How does the project monitor acceptance sampling and testing, independent assurance sampling and testing, concrete plant operations, manufactures certification of appropriate items (ex. curing compound)?
- b. Are these materials records found to be orderly?
- c. Review a sample of completed concrete cylinder strength test results:

CLASS OF CONCRETE (A,B,K,ETC,)	STRENGTH TESTS (MPa)	MINIMUM SPECIFICATION REQUIREMENTS (MPa)	MEET SPECS. (YES/NO)

- d. Any problems noted?

3. Is the contractor meeting the requirements of the Quality Control Plan

IV. Closeout Conference:

1. Discuss all findings and come to an agreement on corrective actions when required.
2. Any recommendations from the review or from the project personnel?